

REMARKS/ARGUMENTS

Reconsideration of this application is requested. Claims 4-19 will be pending in this application subsequent to entry of this amendment. Currently claims 4-16 are withdrawn as directed to non-elected species but presumably will be rejoined or otherwise reviewed upon the indication of allowable subject matter. Claim 17 is withdrawn as directed to a non-elected invention and canceled.

Discussion of Claim Amendments/New Claims

Claims 1-3 were examined on the merits and the subject of various obviousness-type double patenting and provisional obviousness-type double patenting rejections based on four documents. There are corresponding anticipation rejections based on the same documents. The documents cited and applied in the current Action are assigned to the owner of the subject application; all of them include Mr. Kazuyuki Hayashi as an inventor/patentee.

Claims 1 and 2 were revised to include dispersion average particle and dispersion maximum particle diameter maximums, namely when the organic-inorganic composite pigment is dispersed in a transparent coloring composition it has a dispersion average particle diameter (Dd_{50}) of not more than 300 nm and a dispersion maximum particle diameter (Dd_{99}) of not more than 1,000 nm. These claims now appear as new claims 18 and 19. As a consequences claims 1-3 have been deleted.

Overview of Applicants' Contributions to the Art

Applicants' claims, as above amended, are directed to a transparent coloring composition composed of an organic-inorganic composite pigment comprising fine white inorganic particles, a surface modifier layer formed on the surface of the respective fine white inorganic particles and an organic pigment adhered to the surface of the surface modifier layer. Primary particles of the composite pigment have an average particle diameter of 1 to 100 nm. The composition also includes a solvent.

When the organic-inorganic composite pigment is dispersed in a transparent coloring composition it has a dispersion average particle diameter (Dd_{50}) of not more than 300 nm and a dispersion maximum particle diameter (Dd_{99}) of not more than 1,000 nm.

The technical problem solved by the present invention is to attain a sharp particle size

distribution, excellent photofatigue resistance and a high transparency of the transparent coloring composition.

In order to solve the above-mentioned technical problems, the inventors determined that – by treating the surface of fine white inorganic particles with an organic surface modifier and then mixing and milling the resultant surface—treated fine white inorganic particles with an organic pigment to provide (i) an average particle size of the primary particles to 1 to 100 nm, (ii) a dispersion average particle diameter (Dd_{50}) of the organic—inorganic composite pigment dispersed in the transparent coloring composition to not more than 300 nm and (iii) a dispersion maximum particle diameter (Dd_{99}) thereof to not more than 1,000 nm — it is possible to obtain an organic—inorganic composite pigment containing primary particles exhibiting a sharp particle size distribution, excellent photofatigue resistance and high transparency.

The invention provides a coloring composition containing an organic—inorganic composite pigment having not only a sharp particle size distribution but also exhibiting an excellent photofatigue resistance and excellent spectral properties.

Response to obviousness-type double patenting and provisional obviousness-type double patenting rejections

In items 7 – 11 of the Action, three issued U.S. patents and a pending application have been cited against claims 1-3 are the subject of obviousness-type double patenting and provisional obviousness-type double patenting rejections. Detailed response to these rejections will be held in abeyance until this response and the accompanying evidence are considered and allowable subject matter is indicated.

Response to Prior Art-Based Rejections

The documents cited and applied in items 13 – 18 of the current Action are assigned to the owner of the subject application; all of them include Mr. Kazuyuki Hayashi as an inventor/patentee. Accordingly they are available as prior art only under 35 USC §102 and not under 35 USC §103(a).

Applicants respond to these rejections on the basis of revised new claims 18-19 and evidence provided by Mr. Kazuyuki Hayashi in his declaration made May 18, 2006 submitted with this response. Mr. Hayashi is well familiar with each of the citations and the research work

underlying them and is highly qualified to provide additional data and comparisons.

US Patent No. 6,596,071 (**Hayashi '071**) discloses organic and inorganic composite pigments having an average particle diameter of 0.01 to 10.0 μm , comprising: white inorganic particles; a coating formed on surface of the white inorganic particles, comprising organosilane compounds obtainable from alkoxysilanes, or polysiloxanes; an organic pigment coat formed on the coating in an amount of 1 to 200 parts by weight based on 100 parts by weight of the white inorganic particles; and an ultraviolet light-absorbing agent existing in at least a part of any portion from the surface of the white inorganic particle to the surface of the organic pigment coat.

The technical problem addressed by Hayashi '071 is to decrease the amount of organic pigments desorbed from the surface of the white inorganic particles, while providing an excellent clear hue and an excellent light resistance.

US Patent No. 6,737,211 (**Hayashi '211**) discloses a color toner comprising: a binder resin, and a colorant having an average particle diameter of 0.005 to 0.30 μm , comprising: extender pigments, a gluing agent-coating layer formed on the surface of the extender pigment, and an organic pigment coat formed onto the gluing agent-coating layer in an amount of 1 to 500 parts by weight based on 100 parts by weight of the extender pigments.

The technical problem addressed by Hayashi '211 is to attain a clear hue and excellent fluidity.

Published US Patent Application publication No. 2002/0069790 (**Hayashi '790**) discloses composite particles having an average particle diameter of 0.001 to 10.0 μm , comprising: white inorganic particles as core particles; a gluing agent coating layer formed on the surface of the white inorganic particles; and an organic pigment coat formed onto the gluing agent coating layer in an amount of from 1 to 500 parts by weight based on 100 parts by weight of the white inorganic particles.

The technical problem addressed by Hayashi '790 is to provide composite particles which are substantially free from desorption of the organic pigment from the surface, and contain no harmful elements.

US Patent No. 6,623,557 (**Hayashi '557**) discloses a colorant for ink-jet printing ink, having an average particle diameter of 0.001 to 0.15 μm , comprising: extender pigments as core

particles; a gluing agent coating layer formed on at least a part of the surface of the core particle; and an organic pigment coat uniformly formed on at least a part of the gluing agent coating layer.

The technical problem addressed by Hayashi '790 is to attain not only a high tinting strength and a clear hue but also excellent dispersibility and light resistance in spite of the fact that the particles are very small.

US Patent Application publication No. 2003/0116758 (Morii) [corresponds to SN 10/253,906 cited in a provisional obviousness-type double patenting rejection] discloses a coloring composition for a color filter, comprising: a colorant for a color filter composed of composite particles having an average particle diameter of 0.001 to 1.0 μm , and comprising white inorganic particles, a gluing agent coating layer formed on the surface of the white inorganic particle and an organic pigment coat formed on the gluing agent coating layer in an amount of 1 to 500 parts by weight based on 100 parts by weight of the white inorganic particles; a dispersant; a binder resin; a monomer as a reactive diluent; a polymerization initiator; and a solvent.

The technical problem addressed by Hayashi '790 is to provide an excellent dispersibility, and not only a sharp particle size distribution but also an excellent light resistance of the colorant.

The attached Hayashi Declaration shows the dispersion average particle diameter (D_{d50}) and the dispersion maximum particle diameter (D_{d99}) of Experiments 1 to 5 are not less than 338 nm and not less than 1166 nm, respectively, which are respectively out of the scope of applicants' claims.

As a result, the transmittance values at wavelengths of 620 nm of the red-based transparent coloring composition and at wavelengths of 650 nm of the green—based transparent coloring composition of Experiments 5 are 3.1% and 1.5%, respectively, which are inferior to those of the Examples according to the present invention (as seen from the Table 11 of the specification, the transmittance values at wavelengths of 620 nm and 650 nm are less than 1%).

In addition, the transmittance values at wavelengths of 460 nm of the blue—based transparent coloring composition of Experiments 1 and 3 are 10.8% and 12.2%, respectively, which are out of the scope of the present invention. Also, the transmittance values at wavelengths of 610 nm of the blue—based transparent coloring composition of Experiments 2, 4 and 5 are 1.5%, 1.6% and 1.3%, respectively, which are inferior to those of the Examples of

present invention (as seen from the Table 11 of the specification, the transmittance values at wavelengths of 610 nm are less than 1%).

The transparent coloring composition using the green-based organic-inorganic composite pigment of the present invention exhibits a 530 nm transmittance of usually not less than 65%, preferably not less than 70%, more preferably not less than 75%; a 650 nm transmittance of usually not more than 5%, preferably not more than 3%, and in Examples, less than 1%.

That is, in the transparent coloring composition using the green-based organic-inorganic composite pigment of this invention, it is required that the transmittance value at 530 nm is not less than 65% and the transmittance value at other wavelength, for example 650 nm is more preferably less than 1%. As a result, the transparent coloring composition exhibits a more distinct color, and a color film having a more superior contrast can be obtained.

In addition, in the case where the transmittance values at wavelengths of 620 nm of the red-based transparent coloring composition is not less than 65% and the transmittance value at another wavelength, for example, 550 nm is more preferably less than 1%, the transparent coloring composition exhibits a more distinct color, and a color film having a more superior contrast can be obtained.

In the case where the transmittance values at wavelengths of 460 nm of the blue-based transparent coloring composition is not less than 65% and the transmittance value at another wavelength, for example, 610 nm is more preferably less than 1%, the transparent coloring composition exhibits a more distinct color, and a color film having a more superior contrast can be obtained.

Accordingly, when (i) the transmittance value at wavelengths of 530 nm of the green-based transparent coloring composition is not less than 65% and the transmittance value at the wavelength of 650 nm is not less than 1%, (ii) the transmittance value at wavelengths of 620 nm of the red-based transparent coloring composition is not less than 65% and the transmittance value at the wavelength of 550 nm is not less than 1%, and (iii) the transmittance values at wavelength of 460 nm of the blue-based transparent coloring composition not less than 65% and the transmittance value at the wavelength of 610 nm is not less than 1%, the transparent coloring composition is not distinct, and the contrast of the color film is deteriorated.

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Accordingly, the transparent coloring composition of the present invention is novel over the disclosures of each of Hayashi, 071, Hayashi '211, Hayashi '557 and Morii.

For the above reasons and attached evidence it is respectfully submitted the claims of this application are directed to novel and inventive subject matter. Reconsideration and favorable Action are requested. Should the examiner require further information please contact the undersigned.

Respectfully submitted,

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